



Federal Communications Commission
Washington, D.C. 20554

June 1, 2017

DA 17-441

Robert D. Primosch
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1800 M Street NW, Suite 800N
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Subject: Amtrak Request for Waiver, ET Docket No. 16-415

Dear Mr. Primosch:

For the reasons discussed below, we grant your request of December 13, 2016, filed on behalf of National Railroad Passenger Corporation (d/b/a Amtrak), for a waiver of Sections 15.407(a)(1)(iii) and 15.407(a)(3) of the Commission's Rules, 47 C.F.R. §15.407(a)(1)(iii) and §15.407(a)(3), subject to the conditions set forth at the end of this letter.¹ This action will permit Amtrak to deploy operations on its wireless trackside network (TSN) within the Northeast Corridor (NEC)² under the specifications that apply to fixed point-to-point operation in both the 5.15-5.25 GHz (U-NII-1) and 5.75-5.85 GHz (U-NII-3) bands.³ As you observe, this use of the TSN will permit Amtrak to satisfy growing demand for high-capacity broadband aboard its NEC trains, and is a technically and commercially viable way for Amtrak to provide such connectivity within the heavily traveled NEC right-of-way (ROW).

You describe the TSN as being comprised of two major parts. The first part consists of U-NII access points configured with an 80 megahertz-wide channel installed on 60-foot masts constructed, on average, approximately 0.8 miles apart along the NEC ROW. These access points are connected directly to Amtrak's fiber network, which in turn is connected to the Internet.⁴ The second part consists of two radios installed on each train that communicate with the access points.⁵ The trackside access points use a directional antenna with a narrow

¹ National Railroad Passenger Corporation d/b/a Amtrak Request for Waiver of Sections 15.407(a)(1)(iii) and 15.407(a)(3) (Waiver Request) dated December 13, 2016, from Robert D. Primosch, Wilkinson, Barker, Knauer, LLP. The Waiver Request was docketed under ET Docket No. 16-415 and placed on public notice on January 27, 2017.

² The 457-mile mainline Northeast Corridor, which stretches from Boston to Washington, D.C., is the nation's most congested rail corridor and is among the highest volume rail corridors in the world. <http://nec.amtrak.com/facts-and-data>.

³ Waiver Request at 1.

⁴ *Id.* at 5-6.

⁵ *Id.* While each Amtrak train is equipped with two radios that communicate with Amtrak's access points, no more than one of those train-based radios is communicating with the TSN at any given time.

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beamwidth to maximize the transmission along the Amtrak ROW and minimize wasted energy that would occur if the RF signal were permitted to propagate more widely.⁶

To meet capacity needs in the NEC, you have identified the need to operate in both the U-NII-1 and U-NII-3 bands under a uniform set of technical specifications.⁷ You state that although the TSN operates in a point-to-point mode in that there are no multipoint or omnidirectional transmissions, the TSN does not operate as a fixed network because the radios on the trains are moving.⁸ Under Section 15.407(a)(1)(iv), client radios for non-fixed operations within the U-NII-1 band are limited to an output power of 250 mW with antenna gain up to 6 dBi.⁹ You state that this drop in power from 1 watt that would be allowed for fixed point-to-point operations materially reduces the geographic range within which client radios may communicate with associated access points and the reduction in coverage area would require deployment of three times as many trackside access points.¹⁰ You therefore request a waiver to operate in the U-NII-1 band under the fixed point-to-point provisions of 15.407(a)(1)(iii). Similarly, Section 15.407(a)(3) permits only fixed point-to-point operations in the U-NII-3 band to operate with the maximum output power and antennas with gain greater than 6 dBi.¹¹ You therefore request that the TSN be treated as a fixed point-to-point operation in this band as well. In summary, because of the impracticalities of augmenting the TSN to comply with the non-fixed power limits and capacity needs that necessitate the use of multiple U-NII bands, you request a waiver of the rules to allow the TSN to operate under the technical specifications for fixed point-to-point U-NII devices.

We are authorized to grant a waiver under Section 1.3 of the Commission's Rules if the petitioner demonstrates good cause for such action.¹² Good cause, in turn, may be found and a waiver granted "where particular facts would make strict compliance inconsistent with the public interest."¹³ To make this public interest determination, the waiver cannot undermine the purposes of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.¹⁴

⁶ *Id.* at 12.

⁷ *Id.* at 8. For example, you state that demand already exceeds one terabyte per day on Amtrak trains alone. *Id.* at 6.

⁸ *Id.* at 13.

⁹ 47 C.F.R. § 15.407(a)(1)(iv).

¹⁰ Waiver Request at 8.

¹¹ 47 C.F.R. § 15.407(a)(3).

¹² See 47 C.F.R. § 1.3. See also *ICO Global Communications (Holdings) Limited v. FCC*, 428 F.3d 264 (D.C. Cir. 2005); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

¹³ *Northeast Cellular*, 897 F.2d at 1166; see also *ICO Global Communications*, 428 F.3d at 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59.

¹⁴ See, e.g., *WAIT Radio*, 418 F.2d at 1157; *Northeast Cellular*, 897 F.2d at 1166.

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The U-NII-1 band is allocated on a primary basis to the Aeronautical Radionavigation Service for both Federal and non-Federal operations and on a primary basis for the Fixed Satellite Service (FSS) (Earth-to-space) for non-Federal operations.¹⁵ The allocation for the FSS in the U-NII-1 band is limited to feeder links for non-geostationary orbit (NGSO) satellite systems in the Mobile Satellite Service (MSS).¹⁶ Globalstar, Inc. (Globalstar) is the sole NGSO MSS feeder link operator in the United States in this band.¹⁷ The U-NII-3 band is allocated on a primary basis to the Radiolocation Service for Federal operation, and is allocated on a secondary basis to the Amateur Radio Service for non-Federal operation.¹⁸ Because Amtrak's operations will consist of unlicensed devices operating under our Part 15 rules, it must not cause harmful interference to licensed users and its operations are not entitled to interference protection.¹⁹

We conclude that a waiver to permit Amtrak's TSN to operate under the fixed point-to-point provisions of Sections 15.407(a)(1)(iii) and 15.407(a)(3) will not undermine the purpose of the rules. The TSN bears many characteristics of a fixed point-to-point network. Both the access points and train-based radios transmit in a highly directional manner. Because Amtrak's operations will be exclusively within the bounds of the NEC ROW, its mobile operations will essentially be operating at a series of fixed linear points along a defined path. A trackside station will only communicate with a single on-train radio at any given time and only transmit when a train is in position to form the other end of the link; Amtrak estimates that any individual link will typically remain active for less than twenty seconds while a train is in motion, and trains standing in stations may be connected for several minutes.²⁰ Notably, Amtrak only needs a waiver for the intermittent and brief transmissions that occur while its trains are in motion; when a train is stopped at any of these points (such as at a station or red signal), then its higher power operations would be compliant with our rules. Furthermore, Globalstar supports Amtrak's waiver request as

¹⁵ See 47 C.F.R. § 2.106, Table of Frequency Allocations.

¹⁶ See 47 C.F.R. § 2.106 note 5.447A.

¹⁷ Globalstar's satellites communicate with mobile end-user devices via spot beams using the 1610-1618.725 MHz band for the uplink and using the 2483.5-2500 MHz band for the downlink. *Spectrum and Service Rules for Ancillary Terrestrial Components in the 1.6/2.4 GHz Big LEO Bands*, IB Docket No. 07-253; *Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, Second Order on Reconsideration, Second Report and Order, and Notice of Proposed Rulemaking, 22 FCC Rcd 19733 (2007). The satellites are connected to the phone network and Internet through a terrestrial network of fixed earth stations called gateways. These gateways use feeder links to communicate with the NGSO MSS satellites in the 5.096-5.25 GHz band for uplink communication and the 6.9-7.055 GHz band for downlink communication. See *Globalstar Licensee LLC Application of Modification of Non-geostationary Mobile Satellite Service Space Station License, Order*, 26 FCC Rcd 3948, 3949, para. 3 (Int'l Bur., 2011). Globalstar's gateway in Clifton, Texas also receives telemetry signals from Globalstar satellites in the 6.875-6.878 GHz band and transmits telecommand signals to the satellites in the 5.091-5.092 GHz band. *Id.* at 3950, para. 3. In addition to the gateway in Clifton, Texas, Globalstar currently is licensed to operate gateway stations in Sebring, Florida, Wasilla, Alaska, and Cabo Rojo, Puerto Rico. *Id.* at 3949-50, n.3.

¹⁸ See 47 C.F.R. § 2.106.

¹⁹ 47 C.F.R. § 15.5.

²⁰ Waiver Request at 15.

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long as the TSN operates in accordance with the proposed conditions initially submitted with the waiver request.²¹ We also note that the provision in Section 15.407(a)(1)(i) that restricts the maximum e.i.r.p. at any elevation above 30 degrees as measured from the horizon to not exceed 125 mW is not being waived.²² This provision was specifically crafted to protect Globalstar's operations.

We find that this waiver can be granted based on the record before us, and that no additional information or studies are necessary.²³ Amtrak is not seeking to operate in excess of power limits for fixed point-to-point operations already contemplated within the U-NII-1 rules, which at the time the rules were adopted were already determined sufficient to protect authorized users of the bands.²⁴ In addition, we will not condition this waiver on Amtrak's use of any particular equipment for its TSN, so long as that equipment complies with the FCC's equipment authorization rules.²⁵ The Part 15 rules do not mandate the specific equipment an operator must use within its network.

We also find that Amtrak's request satisfies the second prong of the waiver standard. You describe how a grant of the waiver will give Amtrak the capacity it needs to improve its existing Wi-Fi service and consistently deliver even faster connection speeds as it builds out its TSN,²⁶ and how Amtrak has considered multiple alternatives and determined that the spectrum in the 5 GHz band will best satisfy its need for additional capacity.²⁷ The waiver will serve the public interest by allowing Amtrak to provide a continuity of service and an improved experience for its rail passengers, and give them access to a level of broadband service while traveling the NEC that is comparable to what they receive at home or at work. More generally, grant of the waiver promotes the Commission's interest in facilitating the ubiquitous deployment of broadband for all Americans, including those in transit between the major northeastern metropolitan areas.

Additionally, we see little value associated with strict application of the rules for Amtrak's TSN. We find that, under this waiver, licensees will continue to be protected from harmful interference. Because Amtrak's TSN is designed to operate optimally and with fewer radios by utilizing highly directional antennas with higher power output, we conclude that there is little practical benefit in

²¹ See Globalstar, Inc. Comments at 2-3. See also Waiver Request at Exhibit A.

²² 47 C.F.R. § 15.407(a)(1)(i).

²³ See IEEE 802 Comments at 1 (asking that the Commission to not proceed in granting a waiver if and until an impact study is done, and reviewed and evaluated by IEEE 802).

²⁴ See *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, ET Docket No. 13-49, 29 FCC Rcd 4127 (2014).

²⁵ See Wi-Fi Alliance Comments at 4 (urging Amtrak to commit to building any U-NII band system using only Wi-Fi Certified equipment in order to ensure compatibility with other Wi-Fi devices).

²⁶ Waiver Request at 11.

²⁷ *Id.* at 6-7. Amtrak describes how it has considered multiple alternatives and determined that the unlicensed spectrum in the 5 GHz band will best satisfy its needs for additional capacity. *Id.* at 7.

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requiring Amtrak to comply with the existing rules; doing so would necessitate the use of a greater number of transmitters and add to the costs associated with deployment of the TSN.

Lastly, we structure our relief narrowly by incorporating into the waiver conditions that limit the deployment of the TSN to the core Boston-Washington, D.C. portion of the NEC, specify the total number of radios that can be used with the system, and set forth the boundaries of permissible communications. These conditions are those suggested by Amtrak²⁸ as well as other commenters,²⁹ and will provide assurance that Amtrak operates in a manner that is compatible with our analysis.

Pursuant to the delegated authority in Sections 0.31, 0.241, and 1.3 of the Commission's Rules, 47 C.F.R. §§ 0.31, 0.241, 1.3, WE WAIVE the requirements of Sections 15.407(a)(1)(iii) and 15.407(a)(3) of our Rules to allow to permit Amtrak to operate its NEC-based TSN under the specifications that apply to fixed point-to-point operation in the 5.15-5.25 GHz (U-NII-1) and 5.75-5.85 GHz (U-NII-3) bands.

This waiver IS LIMITED to Amtrak's TSN and its use as described in the waiver request, and IS SUBJECT to the following conditions:

- 1.) The total number of stations, including both trackside and train-based stations, operating pursuant to this waiver must be fewer than 1,000.
- 2.) Stations operating under this waiver are only permitted to operate within the right-of-way along the Boston-to-Washington, D.C. segment of Amtrak's Northeast Corridor.
- 3.) Communication is only permitted from trackside stations to train-based stations – no direct-to-consumer connections are permitted.
- 4.) Amtrak must use equipment that is certified to meet the Commission's technical rules for point-to-point operation.
- 5.) No data transmission is permitted from a trackside station unless a train is in position to receive the data transmission.
- 6.) No more than 50 train-based radios are permitted to transmit simultaneously along the entire authorized service area.
- 7.) Amtrak shall report to the Commission any instances of harmful interference and shall be required to cease operations until the conditions causing the interference are corrected.

²⁸ *Id.* at Exhibit A. These conditions are based on several factors: (1) the design of the TSN which limits transmissions to those times when the trackside and train-based stations are in position to close the link, (2) each trackside station communicates with one train-based station at a time, so there are no simultaneous transmissions, and (3) the number of trains operating over the NEC and their schedules. *Id.* at 14-16.

²⁹ *See* WISPA reply comments at 2 (asking that, if the Commission approves the relief requested by Amtrak, the waiver should be limited to the NEC); *see also* Globalstar comments at 2-3.

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This proceeding IS TERMINATED and this docket IS CLOSED should no petitions for reconsideration or applications for review be timely filed.

Sincerely,

Julius P. Knapp
Chief
Office of Engineering and Technology